Submarine, across-arc normal fault system off the east coast of Ishigaki Island, Ryukyu Arc: its evolution and propagation process

Takeshi Matsumoto[1]; Ryuichi Shinjo[2]; Mamoru Nakamura[3]; Asuka Doi[4]; Shouko Tamanaha[4]; Atsuki Kubo[5]

[1] U.Ryukyus; [2] Dept. Physics and Earth Sci., Univ. Ryukyus; [3] Sci., Univ. Ryukyus; [4] Phys. Earth Sci., Univ. Ryukyus; [5] Kochi Earthq. Obs., Kochi Univ.

Recent numerical simulation of tsunami propagation proposed a new hypothesis that the 1771 devastating tsunami around the Miyako-Yaeyama area, Ryukyu Arc, was caused by a slip of the East Ishigaki Fault, a 44km-long fault lying 50km off the east coast of Ishigaki Island. To test the hypothesis, a reconnaissance survey at four representing fault segments was accomplished by ROV Hyper-Dolphin. The southernmost segment shows that the main fault scarp is covered by many large boulders. On the escarpment, 6m sections with a gradient of almost 90 degrees were observed. The result of the survey at the second segment from the south shows similar characteristics as that at the southernmost segment. The northern segment was characterised by wide exposure of limestone outcrop with many cracks and fissures on the outcrop which represents nascent faulting. These facts suggest the northward propagation of the faulting along the main scarp. The cracks and fissures observed at the northern segment are located on the extension of the trough of the main scarp, suggesting the initiation of the crash of the basement. These results demonstrate that the amount of displacement at the fault segments is not uniform. Thus, it is unlikely that the slip at the fault generated the 1771 tsunami, even though simultaneous rupture at multiple fault segments is taken into account.